

Description

The RST1583T uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

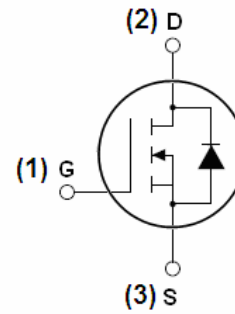
- $V_{DS} = 150V, I_D = 83A$
 $R_{DS(ON)} < 18.5m\Omega @ V_{GS} = 10V$ (Typ: 15.7m Ω)
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

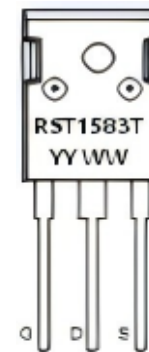
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Schematic diagram



Marking and pin assignment



TO-247 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
RST1583T	RST1583T	TO-247	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	83	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D (100^\circ C)$	58	A
Pulsed Drain Current	I_{DM}	330	A
Maximum Power Dissipation	P_D	320	W
Derating factor		2.13	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	500	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.47	°C/W
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Electrical Characteristics (TA=25°C unless otherwise noted)

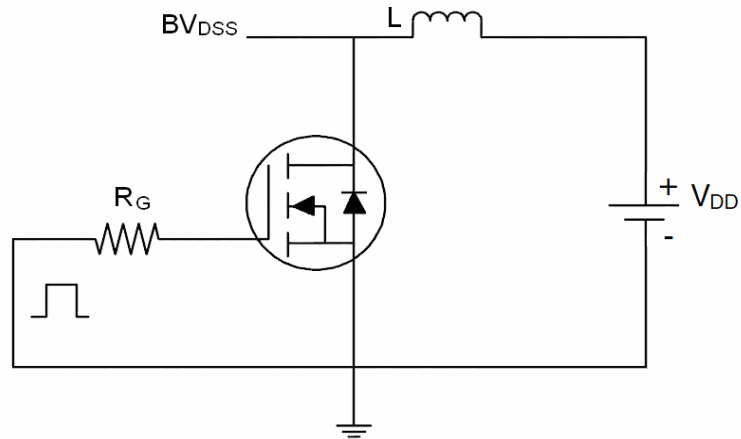
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	150	160	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =150V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3.1	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	15.7	18.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =15V, I _D =40A	120	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	11000	-	PF
Output Capacitance	C _{OSS}		-	463	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	352	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	VDD=30V, ID=2A, RL=15Ω, RG=2.5Ω, VGS=10V	-	40	-	nS
Turn-on Rise Time	t _r		-	38	-	nS
Turn-Off Delay Time	t _{d(off)}		-	140	-	nS
Turn-Off Fall Time	t _f		-	60	-	nS
Total Gate Charge	Q _g	ID=30A, VDD=30V, VGS=10V	-	250	-	nC
Gate-Source Charge	Q _{gs}		-	48	-	nC
Gate-Drain Charge	Q _{gd}		-	98	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	83	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 75A di/dt = 100A/μs ^(Note3)	-	48	-	nS
Reverse Recovery Charge	Q _{rr}		-	78	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

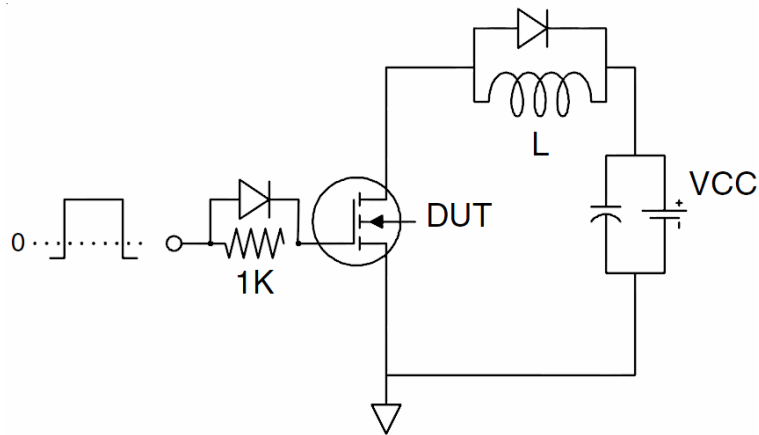
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : $T_J=25^\circ C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test Circuit

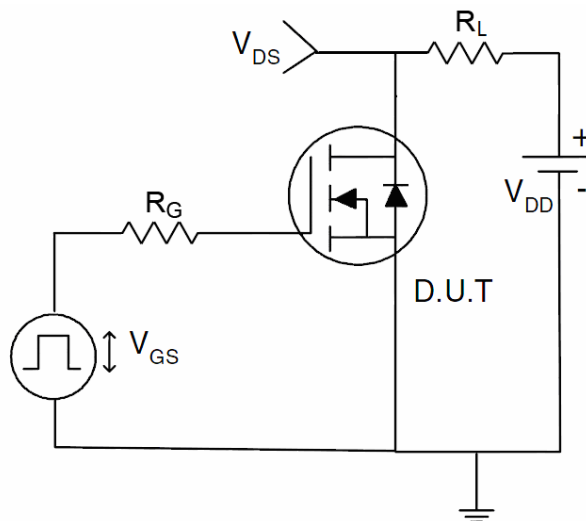
1) E_{AS} test Circuit

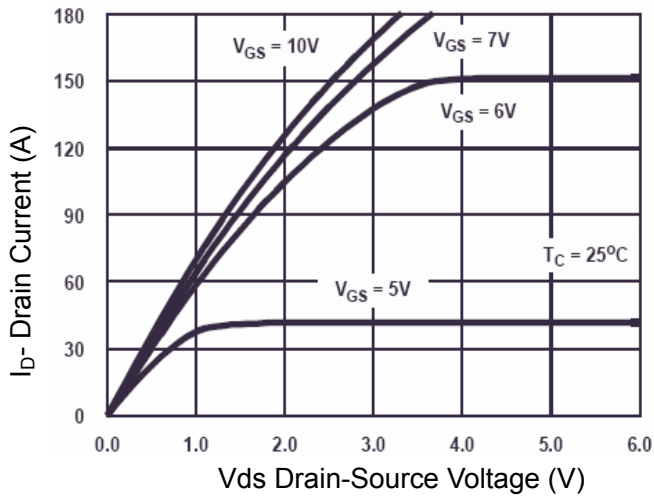
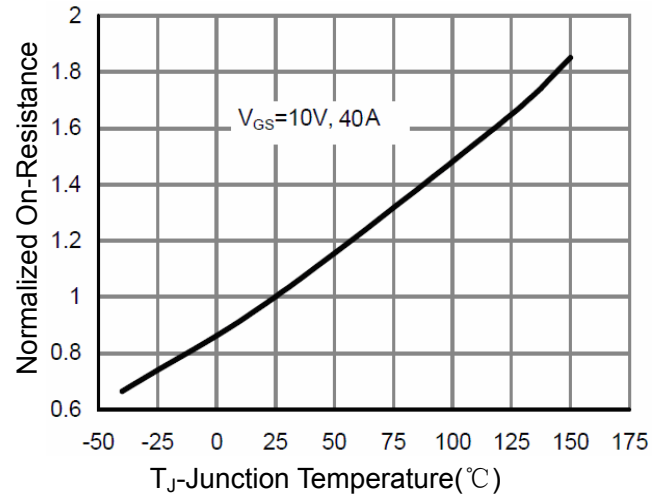
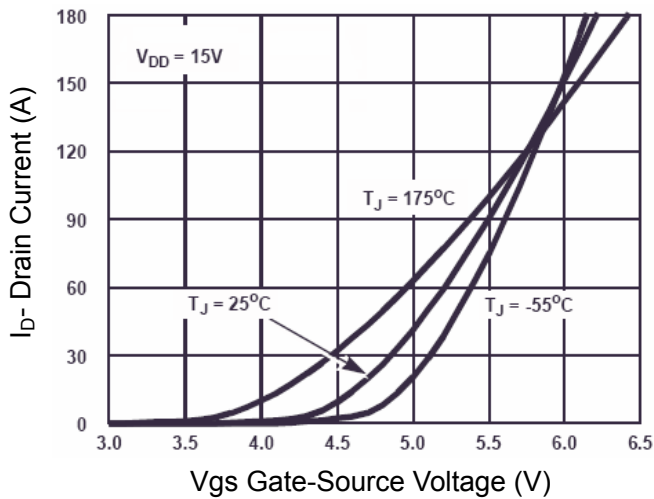
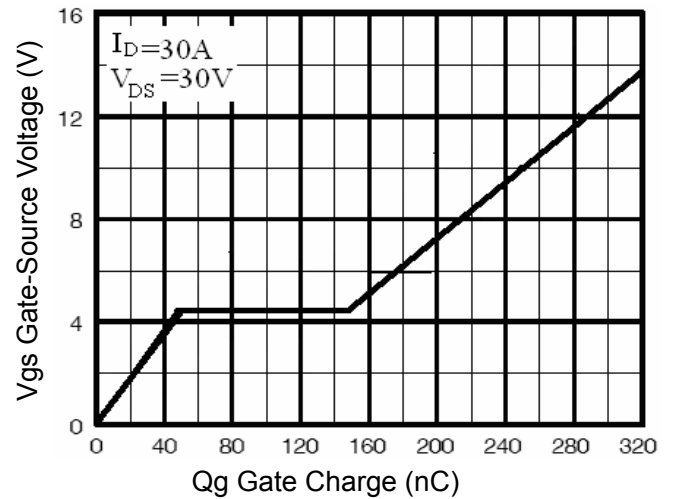
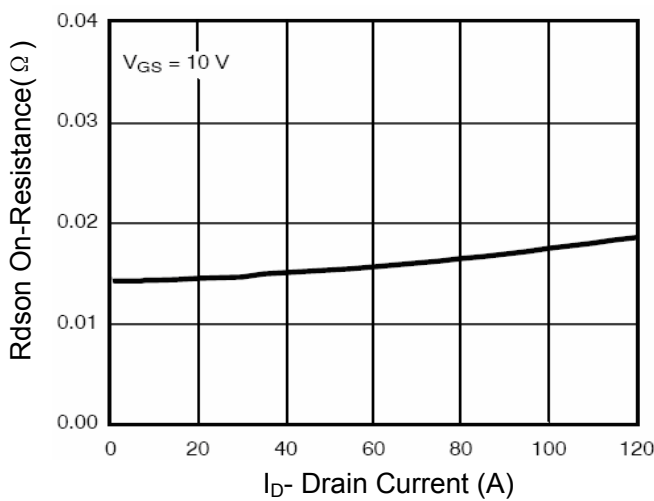
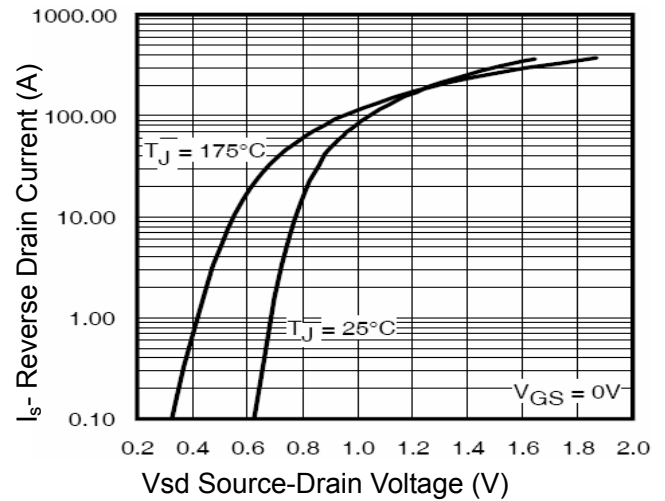


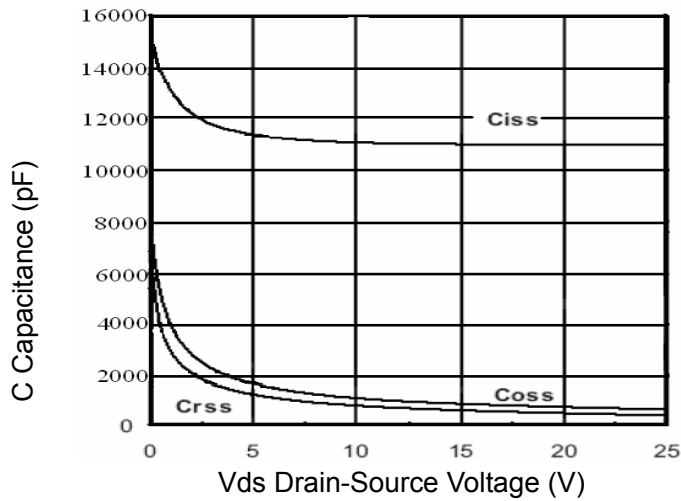
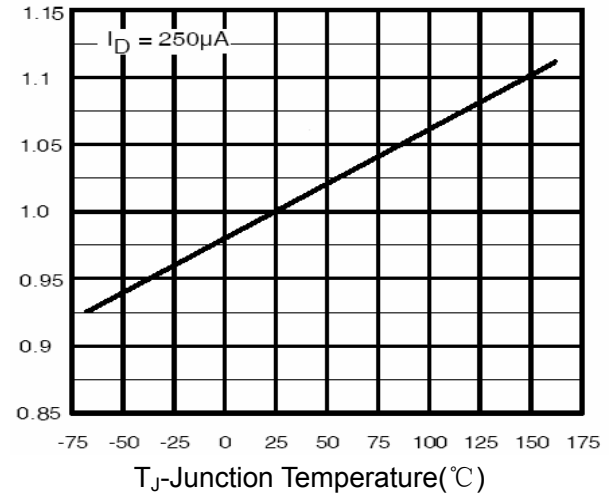
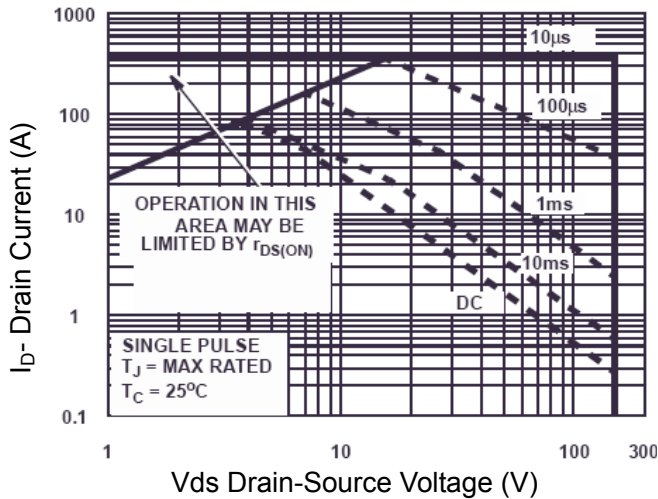
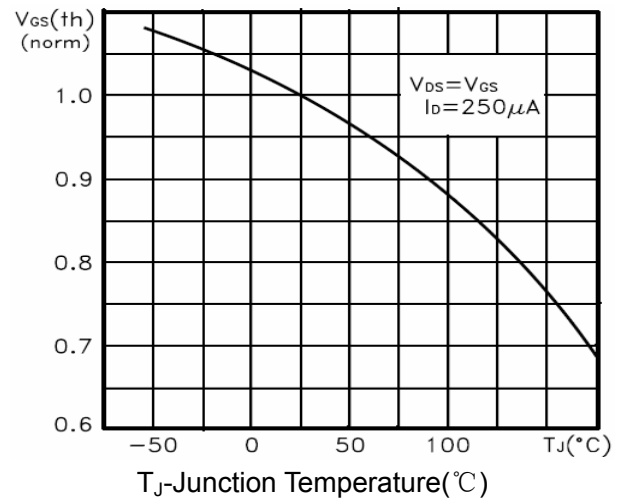
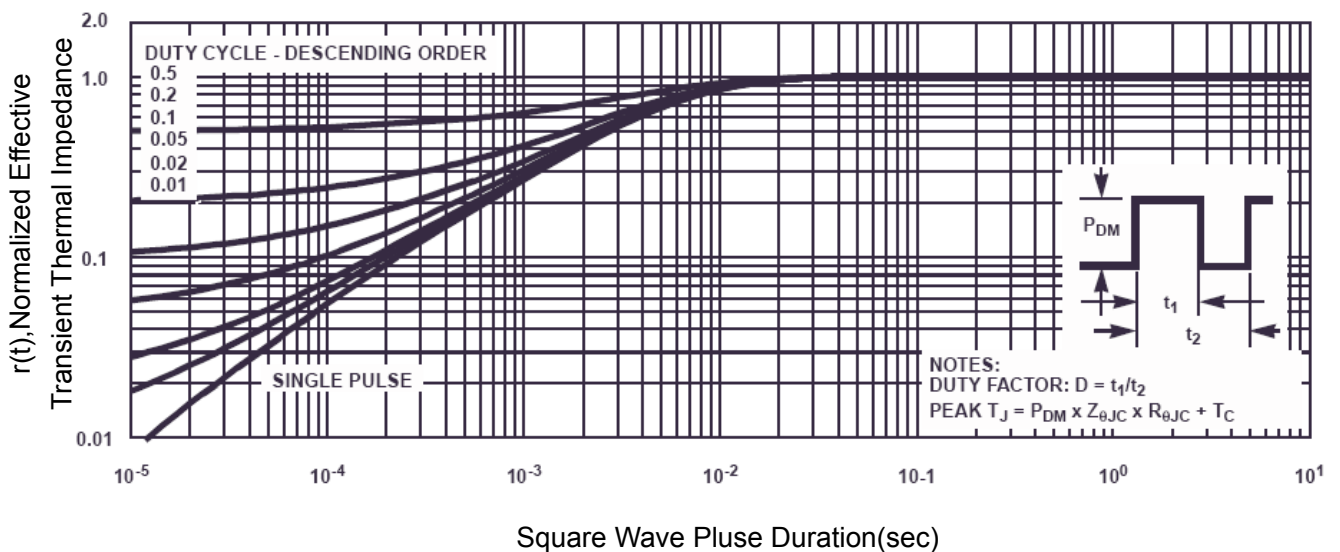
2) Gate charge test Circuit

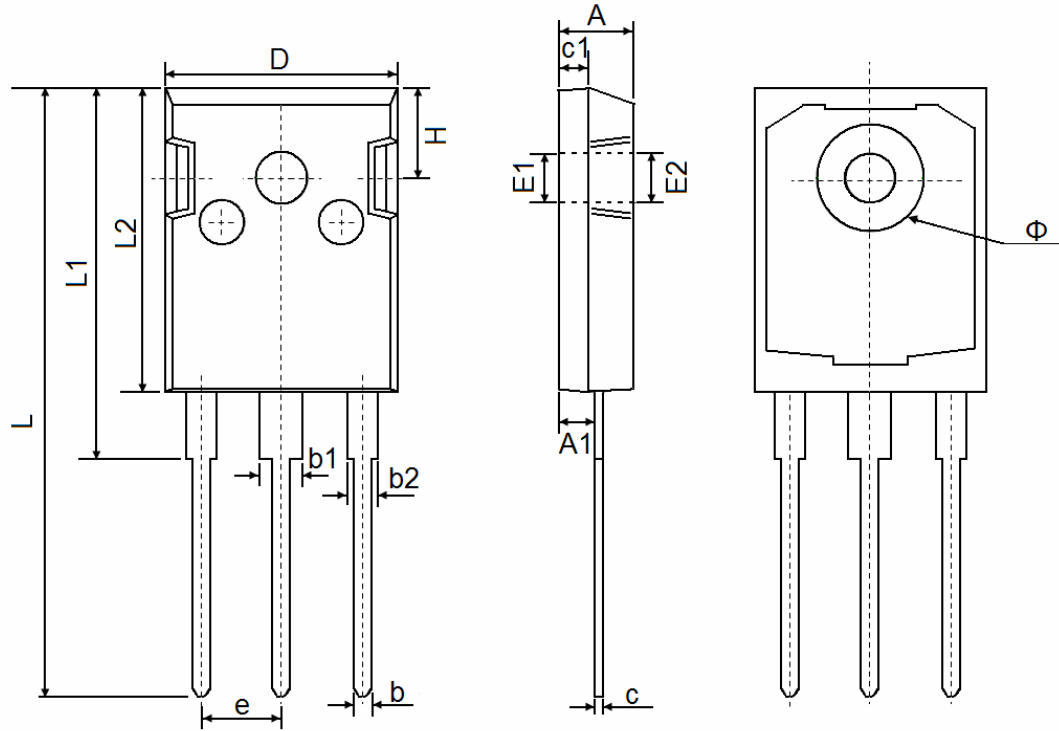


3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

Figure 1 Output Characteristics

Figure 4 Rdson-Junction Temperature

Figure 2 Transfer Characteristics

Figure 5 Gate Charge

Figure 3 Rdson- Drain Current

Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 BV_{DSS} vs Junction Temperature

Figure 8 Safe Operation Area

Figure 10 $V_{GS(th)}$ vs Junction Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance

TO-247 Package Information
Pb Free Product


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	